FRD Activities Report
May 2002

Research Programs

IMS Development Project

During this past month we constructed and have been operating our second IMS instrument. It is constructed out of teflon and stainless steel rings machined to fit together. The internal diameter is one-inch. The new ion gate appears to operate very effectively, shutting off essentially all ion current when in the closed condition, resulting in almost no DC current in the amplifier. We have used several configurations of corona discharge sources and the photoelectric effect to generate ions and observe the reactant ion peaks. Unfortunately, we have not been able to observe SF_6 peaks with our current configuration. One of the problems is that the peaks in the spectra are much wider than those typical in published literature. We are not sure if this is due to reactions continuing in the drift region or contamination in the system. It is possible that the wide reactant ion peaks are hiding the SF_6. We are now working on reducing the width of the observed peaks in the spectra and also plan to try a couple more configurations of the photoelectric source and the corona discharge over the next few weeks. (Roger.Carter@noaa.gov, Shane Beard, Debbie Lacroix)

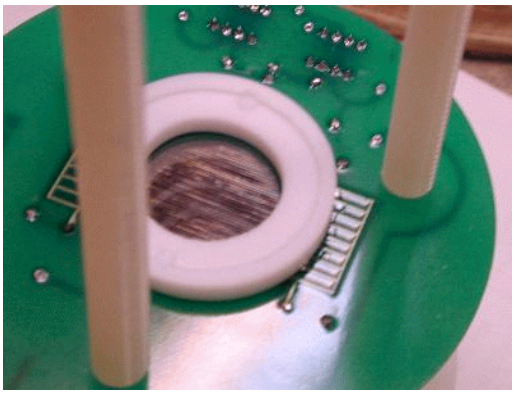

Figure 1. Ion gate being installed in the IMS.

Figure 2. Assemble IMS drift cell.

ET Probe

A series of tests of the ET probe were performed in May by mounting the probe on the back of a pickup truck and driving at highway speeds. A large number of data dropouts were observed with the system, and they showed a peculiar pattern. The probe consists of separate hemispheres with their own sensors, A/D boards, etc. When the center of a hemisphere is facing into the wind, few data dropouts occur while the pickup is moving below about 17 m/s, but they become common

above that speed. When the seam between the hemispheres is facing into the wind, the opposite result is observed, with the dropouts mainly occurring below about 17 m/s. There are several possible explanations for the dropouts, including calibration errors and software problems, and these are being investigated. (Richard.Eckman@noaa.gov, Tom Strong, Roger Carter)

Hurricane Balloon

May 5 to May 9, 2002 a visit was made to Mexico to make to get permission and make arrangements for launching balloons from the west coast of Mexico. On Monday morning a meeting was held with Dr. Michael Rosengaus, the director of the Servicio Meteorologico National (SMN). He is very interested in hurricane research and the hurricane balloon project. In addition to his interest in this project, he committed an English speaking employee (Mr. Armando Rodriguez) to provide a tour of the selected balloon launch facility in Acapulco later in the week. During our meeting with Dr. Rosengaus, a presentation was made showing the operation and goals of the hurricane balloon. Following this presentation, Dr. Rosengaus provided a very informative presentation about hurricanes off the west coast of Mexico (in the eastern Pacific).

On Monday afternoon a meeting was held with Angelica Narvaez, a specialist in Science and the Environment at the US Embassy, who will help this project in obtaining permission to do scientific research in Mexico through the Secretaria De Relaciones Exteriores (SRE). Ms. Narvaez provided us with all of the forms necessary to request permission and advice on completing these forms.

The next day Dr. Dave Raymond provided a tour of the University of Mexico and an introduction to a number of his colleagues at the university. Dr. Raymond also provided data/plots from the TEXMEX flights in 1991 showing vertical velocity in storms that were flown through during this project. Later that afternoon, travel arrangements were made and tickets were purchased to travel to the balloon launch site in Acapulco on Wednesday with Mr. Armando Rodriguez.

Early on Wednesday, the trip was made to the launch site at the Acapulco Airport (about a five minute walk from the airport terminal). The inflation shelter has plenty of room inside and has 12-foot wide doors. The launch site looks like it will work well for balloon preparation and launch. It appears that there may be some interference from some nearby towers but only under certain wind conditions. Should these wind conditions arise at launch time, there is a path over a fence and toward the runway that should provide a good open area for balloon launches.

Early Wednesday afternoon a flight was taken back to Mexico City and a return flight to Idaho Falls on Thursday. (Randy.Johnson@NOAA.gov)

URBAN 2000/VTMX

The NOAA Tech. Memo on meteorological data collected during URBAN 2000 received final approval for publication and went to press this month. A presentation on the mobile real-time SF_6 analyzers was presented at the 4th Symposium on the Urban Environment, sponsored by the American Meteorological Society. Side meetings with URBAN 2000 players and future OKC

2003 players were also held during the meetings. A program plan will be forthcoming in the next month. (Kirk.Clawson@noaa.gov)

CBLAST-Low

Preparations continue for the upcoming CBLAST-Low field study that will be conducted in August 2002 off the coastal waters south of Martha's Vineyard. An example of 60-s (~ 3 km) mean wind vectors at 10-m above the sea surface are shown in Figure 1. The LongEZ flew between 1300 and 1530 local time on August 1, 2001 during the CBLAST-Low pilot study. The winds near the shore (~5-10 km) exhibit the influence of the sea breeze as the cooler air over the ocean is drawn to the warmer air over land. Further away from the coast (~30-40 km), the winds are from the west-southwest and do not exhibit any influence from the island. (Jerry.Crescenti@noaa.gov, Tami Grimmett).

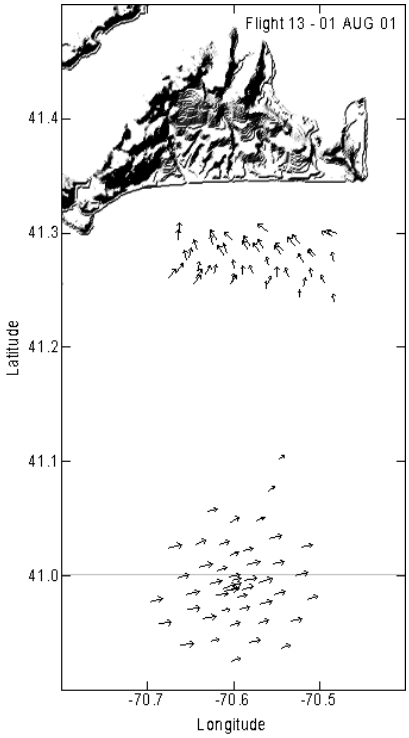

Figure 3. Mean wind vectors from CBLAST-Low Flight 13 (01 AUG 01).

NRC Visit

Judy Nyquist., Deputy Director and Program Administrator of the National Research Council (NRC), visited FRD on May 24, 2002 for a staff visit. The purpose of the visit was to speak with potential Advisers, to access the research progress of and facilities available to Tami Grimmett, NRC Postdoctoral Associate, and to discuss funding issues. A brief presentation on the CBLAST-Low study was given, discussing the current research efforts of Dr. Grimmett. Also a tour of the LongEZ aircraft was given. Dr. Nyquist was pleased with facilities
made available and the support given to Dr. Grimmett.

Cooperative Research with INEEL

Emergency Operations Center (EOC)

Jerry Crescenti and Brad Reese represented FRD during an EOC exercise on May 16, 2002. The drill scenario involved a partial meltdown of a nuclear reactor at the Test Reactor Area (TRA) facility due to a power outage. A special "canned" meteorological data set was prepared by Roger Carter and Neil Hukari for the drill. The simulated data was based on a typical summer day which experiences light northeasterly drainage winds down the Snake River Plain in the morning with a reversal to moderate southwesterly winds in the afternoon. As a result, plume projections from the simulated meltdown presented a challenge to EOC personnel. (Jerry.Crescenti@noaa.gov, Brad Reese, Roger Carter, and Neil Hukari).

INEEL Support

The INEEL Citizens Advisory Board held a meeting at the Ameritel Inn in Idaho Falls on 22-23 May. A presentation was given to the board on FRD's activities at INEEL. It included a description of the Mesonet towers and the dispersion modeling performed by FRD using the MDIFF model. (Richard.Eckman@noaa.gov)

A draft report titled "A Statistical Investigation of Atmospheric Dispersion at the Idaho National Engineering and Environmental Laboratory" was completed in May. It describes an INEEL dispersion study based on the MDIFF model and nine years of Mesonet data. The draft is now undergoing review for eventual publication as a NOAA Technical Memorandum. (Richard.Eckman@noaa.gov)

Some minor modifications were made during May to the MDIFF dispersion model used to support INEEL operations. These were mostly associated with the model's special file mode, which is used to produce "canned" weather scenarios during INEEL exercises. The modifications were requested to be completed in time for a major exercise in mid June. (Richard.Eckman@noaa.gov)

Support appears to be increasing for a major upgrade of the dispersion modeling system that supports INEEL. The current system, based on the MDIFF model, has been in place for many years and in many respects is obsolescent. The State of Idaho and some INEEL personnel have been asking for specific upgrades related to the computation of radiological doses, but no funding has been available to make the upgrades. Likewise, FRD staff is interested in making upgrades to many of the meteorological algorithms. There now appears to be some interest from DOE in making such upgrades. It is not clear at this time whether the upgrades would entail a wholesale replacement of the existing system or just modifications to the existing system. (Richard.Eckman@noaa.gov, Kirk Clawson)

Other Activities

Purdue's New Research Aircraft

Dr. Crawford met with Purdue University staff to advise them on the instrumentation of their new Small Environmental Research Aircraft. Dr. Paul Shepson leads this exciting new effort which will focus on the flux measurement of difficult chemical species. This airborne research effort will be the first to use of disjunct eddy accumulation combined with modern miniature chemical sensors such as ion cylindrical trap mass spectrometers on a small aircraft. We are very excited about the application of this miniature technology on small aircraft and its potential to reduce cost while revolutionizing airborne atmospheric chemistry research.

Another first will be the use of real-time winds to drive the disjunct eddy-accumulation system on a small aircraft. One of our Best Aircraft Turbulence (BAT) probes with software, sensors and A/D system was delivered at the meeting. Detailed discussion followed relating to correct installation and operation. We are very pleased the effort is enthusiastically supported by Purdue's Aviation

Technology Department. Instead of the usual compromise of a pressure radome, a BAT probe will be mounted out from of the aircraft on a boom to mitigate flow distortion. (Tim.Crawford@noaa.gov)

Safety

A conference call was held with other members of the NOAA Environmental Compliance and Safety Assessment System (NECSAS) team on May 8, 2002. The new charter was adopted and is to be sent to the NOAA Environmental Compliance and Safety (ECS) council for review.

The training team has been working on budget issues and a budget and training plan that will be presented at the Environmental Safety Council (ECS) meeting to be held July 29-August 1, 2002. They are also waiting for final Tier I (formal safety audit) reports in order to prioritize the training needs of those audited facilities. FRD is on the list for a Tier II assessment (an assistance visit) sometime in the next couple of years. The policy team had a workshop in March to work on policies including waste disposal, transportation and audit policies. Some policies have already been reviewed by the FRD representative to the team. (Debbie@noaa.inel.gov)

Another NECSAS conference call was held on May 23, 2002. One of the members has drafted a Facilities/Office Safety checklist that must be reviewed by team members as soon as possible. This checklist is the starting block to what is hoped to be several self-audit checklists that will be put on the NOAA safety website. The health and safety team is also working on a new tracking system for illnesses and injuries. This will allow safety reports to be generated for NOAA management in a more timely manner. The members of the team were also tasked to come up with a standard format for Tier II reporting. Copies of the latest Tier II reports will be sent to team members for review and comments. The Department of Commerce is, at this time, following NOAA's approach to assessments. Therefore, it is highly desirable for the team to accomplish their reviews and get policies in place as soon as possible. (Debbie@noaa.inel.gov)

Travel

Tom Watson continues to be on travel status as he participates in the BRACE field project in Tampa, Florida. He left on April 6 and should return to Idaho Falls on June 4.

Randy Johnson traveled to Mexico City and Acapulco May 5 through May 9 for a planning meeting and balloon launch site inspection for the Atlantic Hurricane Project.

Kirk Clawson traveled to Norfolk, Virginia, on May 19 through 24 to present the paper *URBAN 2000 SF_6 Atmospheric Tracer Results from the Suburban Experiment Domain* at the 4th Symposium on the Urban Environment, and to also attend the 12th Joint Conference on the Applications of Air Pollution Meteorology with the Air and Waste Management Association, and the 25th Conference on Agricultural and Forest Meteorology.

Jeff French traveled to Miami, Florida, May 20-23 for the CBLAST-Hurricane Workshop.

Tim Crawford went to Lafayette, Indiana, on May 22-23 at the request of Purdue University for meetings with Dr. Paul Shepson and the Atmospheric Research Program staff to discuss instrumentation and operation of the Purdue University research aircraft.

Papers

Clawson, K. L., and G. H. Crescenti, 2002: Meteorological measurements during the URBAN 2000/VTMX field study. NOAA Technical Memorandum OAR ARL-243, Silver Spring, MD, in press.

Clawson, K. L., R. G. Carter, D. J. Lacroix, N. F. Hukari, K. J. Allwine, and J. H. Shinn, 2002. URBAN 2000 SF_6 atmospheric tracer results from the suburban experiment domain. *4th Symposium on the Urban Environment*, Norfolk, VA, Amer. Meteor. Soc., 182-183.

Visitors

S. T. Rao, director of ARL's Atmospheric Sciences Modeling Division (ASMD), visited FRD on May 2, 2002 to discuss possible cooperative ventures between the two ARL divisions.

Judy Nyquist., Deputy Director and Program Administrator of the National Research Council (NRC), visited FRD on May 24, 2002 for a briefing on the research of NRC Postdoctoral Scholar Tami Grimmett.